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LOCATION BASED CALL ROUTING FOR CALL ANSWERING SERVICES

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FIELD OF THE DISCLOSURE

[0001] The present disclosure relates in general to location based routing and call answering.

BACKGROUND

[0002] In an increasingly mobile society, mobile telephones and telecommunications devices have become ubiquitous. Cell phones and other mobile telecommunications devices offer the ability to be in contact or reachable at all times. However, users of cell phones typically have more than one phone number at which they may be reached. For example, cellular telephone users may also have a landline phone number for their home or office.

[0003] In a typical situation, a caller may attempt one of several numbers in an attempt to reach an individual. For example, a caller may call a home number, then a cell number or office number. This added effort wastes time and telephony resources.

[0004] To save time many callers will call a cell phone or mobile telecommunications device number first. But, receiving a call on a cell phone is more expensive than receiving a phone call on the user's landline phone.

[0005] Some service providers have implemented a service in which different numbers provided by the user are attempted until the user answers. However, callers may become frustrated while waiting through several attempts to connect to the user through different numbers. As such, an improved method for managing phone calls would be desirable.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] **FIG. 1** depicts an exemplary calling service system.

[0007] **FIG. 2** depicts an exemplary proximity zones.

[0008] **FIG. 3** illustrates exemplary embodiments of a calling service system.

[0009] **FIGs. 4 and 5** depicts an exemplary method of providing a calling service.

[0010] **FIGs. 6, 7, and 8** illustrate exemplary embodiment of call management devices.

DESCRIPTION OF THE DRAWINGS

[0011] Referring to FIG. 1, a particular illustrative embodiment of a location based call direction system is shown. The system includes a Find-Me-Follow-Me Service 104 responsive to callers including an illustrative caller 102. The system also includes a proximity zone database 106, and a communication module for polling communication devices based on proximity zone data 108. During operation, a call is received at the Find-Me-Follow-Me Service 104, which retrieves proximity zone data from the database 106. Based on the proximity zone data, the Find-Me-Follow-Me Service 104 communicates a message or sends a call to one of a plurality of available subscriber devices. The particular subscriber device first attempted is based on the proximity zone data. The communication module 108 may poll each of the subscriber devices in an order based upon the proximity zone data in an attempt to reach the subscriber. Examples of illustrative subscriber devices include a land-line phone 110, a work office phone 112, and a mobile device such as a cellular phone 114.

[0012] Referring to FIG. 2, an example of available proximity zones is shown. A home proximity zone 202 is shown as including a center zone point that provides coverage area and an illustrative subscriber device, such as a land-line phone 208 or a laptop personal computer 210. Similarly, an office proximity zone 204 is illustrated including subscriber devices 212 and 214. For the mobile device 206, a mobile proximity zone may be

identified or no proximity zone may be indicated to define that the mobile device 206 is outside of the home proximity zone 202 and the office proximity zone 204.

[0013] Referring to FIG. 3, an illustrative system 300 for implementing routing of calls based on a subscriber location based on proximity zones is shown. The system 300 includes a wireless network 316 and a wire-line computer network 318. The wireless network 316 is coupled to various subscriber wireless devices, such as the mobile device 302. The wire-line network 318, such as the Internet, is coupled to various communication nodes such as a personal computer 312 and a wireless access point 314. The wireless access point 314 may be an 802.11 or Bluetooth type access point providing wireless data access coverage to mobile devices, such as device 306. The personal computer 312 may have a connection such as a USB connection to a cradle that charges and holds a communication device 304. In a particular illustrative embodiment, the mobile devices 302, 304, and 306 may be different devices or may be a common device that is configured to communicate with the various wireless and wire-line infrastructure interfaces. The wireless network 316 and the wire-line computer network 318 are also coupled to the Find-Me-Follow-Me Service 320. During operation of the system, location data may be retrieved from various mobile devices and passed to the Find-Me-Follow-Me Service 320. The Find-Me-Follow-Me Service may, via the wireless or wire-line networks 316 or 318, communicate with wire-line or wireless subscriber devices, such as devices 302, 304, and 306 for handling a call.

[0014] The subscriber wireless device is one example of a location indicator that may indicate proximity of a subscriber to a landline phone. Other examples of a location indicator include key fobs, smart card, RFID device, mobile telephones with built in wireless communication, and devices with contact points such as mobile phones or personal digital assistants (PDAs) with electrical contacts. Proximity may be indicated, for example, through contact with a charging unit or base station, communication with a beacon or wireless access point, global positioning circuitry, ultrasonic signaling, or infrared signaling. A module may determine if the location indicator indicates location of a subscriber within a zone associated with a subscriber communication device such as a landline telephone. The module may be implemented in the mobile subscriber device, in

a device coupled to a distributed computer network, or in a device coupled to a public switch network.

[0015] Referring to FIG. 4, a method of processing calls using a Find-Me-Follow-Me Service and location based routing is illustrated. Location data is received via an interconnected network, at step 402. The location data may be derived from a proximity sensor, such as a proximity sensor located near a particular subscriber mobile device. The location data retrieved is stored in a data record, at step 404. The data record may be located within a database that is accessible to a Find-Me-Follow-Me Service provider.

[0016] An incoming call is received at a primary destination address, at step 406. An example of a primary destination address is a phone number of a Find-Me-Follow-Me Service or a subscriber number for other call-routing services, such as a unified messaging system capable of handling fax, e-mail, voice, and voice-mail traffic. At step 408, an announcement is played to the incoming caller. The announcement may request the caller's name, at step 410, and advise the caller that the Find-Me-Follow-Me Service will locate the subscriber as requested by the caller. As a more particular example, the announcement may be "The subscriber you have called is not available right now. Please speak your name after the tone. I will attempt to locate them, or press 1 to go directly to voice-mail. <Beep>." At this point, the caller speaks their name and the system responds, such as, "Please hold while I locate the subscriber". At this point the system receives and stores the caller's name at step 412.

[0017] The data record is then retrieved to identify a selected address of a communication device of the subscriber that is located within the proximity zone as determined by the proximity sensor, at step 414. For example, a selected address may be a phone number of a mobile phone when the subscriber is determined to be outside of the home or the office proximity zones. As another example, the selected address may be the phone number for the subscribers' residence, when the subscriber is detected as being within the home proximity zone 202. As another example, the selected address may be a work phone number or an electronic address of a work e-mail when the subscriber is determined to be within the office proximity zone 204. At this point the system places a

call to the selected address in an attempt to reach the communication device proximate of the subscriber at step 416.

[0018] Upon detecting an answer by the subscriber, the system plays an announcement to the subscriber that includes the caller's name and prompts for the subscriber's selected action, at step 418. An example of a selected action would be to route the caller to voice mail or to answer the call. The selected action is then performed by the system, at step 420. Where the selected action is to send the caller to voice mail, the system performs such action and initiates a call transfer from the originating caller to an associated voice mail system associated with the subscriber. However, where the call is accepted by the subscriber, then the call received by the service is bridged with the call placed to the subscriber, so that the caller may communicate with the subscriber and a conversation or other communication may then take place.

[0019] Referring to FIG. 5, a method of updating a proximity zone of a subscriber is illustrated. At step 502, location data is received via an interconnected network from a proximity sensor that detects a mobile device of the subscriber. A change in the subscriber proximity zone is detected, at steps 504 and 506. More specifically, the subscriber location is detected as being changed from a first proximity zone to a second proximity zone. For example, the first proximity zone may be the subscriber's home zone 202 and the second proximity zone may be a mobile proximity zone 206. A data record, including location data and including the proximity zone information is then updated, at step 508. For example, a proximity zone field may be included in the data record that would be changed from a first proximity zone state to a second proximity zone state. At step 510, the updated data record is retrieved by a call direction control system. An example of a call direction control system is a control system that provides the Find-Me-Follow-Me type of service. After the updated data record is retrieved by the system, a call is received at the call direction control system, at step 512. The call direction control system, upon detecting the incoming call, would place a second call to a mobile device associated with a subscriber at the second proximity zone. For example, where the second proximity zone is the wireless zone, the call could be directed to the subscriber's cell phone instead of to the subscriber's home or work phone. At step 514, a

caller is then connected via the call redirection control system to the mobile device for communication with the subscriber.

[0020] For example, the caller to the Find-Me-Follow-Me Service may be connected to the subscriber at the subscriber's cell phone. While the method illustrated with respect to FIG. 5 describes a first and a second zone, it should be understood that the subscriber may be at one of a plurality of different zones and the work mobile, and home proximity zones are merely illustrative of particular proximity zone locations.

[0021] Referring to FIG. 6, an illustrative system to identify a proximity zone for a particular subscriber is shown. The system includes a location indicator 612, a proximity sensor 602, a call control module 604, and an interconnected communication network 606. The proximity sensor 602 is coupled to the call control module 604 via a first interface 610, and the call control module 604 is coupled to the interconnected communication network 606 via a second interface 608. The location indicator may be a circuit board or may be circuitry or software within an integrated circuit or other system that may be embedded within a variety of different types of communication devices. An example is a cellular phone, a pager, a smart-card, or a wearable device of a subscriber, such as an electronic wallet. The location indicator is intended to be carried by the subscriber so that the subscriber's location may be determined by the system. The proximity sensor 602 is configured to detect the presence or absence of the location indicator 612 within a proximity zone defined by a coverage area of the proximity sensor 602. An example of a proximity sensor includes a cradle, a wireless beacon, or other similar means of determining the presence or absence of the location indicator within a defined coverage area, such as a home proximity zone area. A call control module 604 may be implemented as software and/or hardware such as is typically found within a personal computer. The call control module 604 includes logic for updating data records and for providing location data in response to measurements detected and communicated from the proximity sensor 602, via the first interface 610. The call control module 604 may communicate call redirection messages, location data updates and proximity zones data via the communication network 606 and via the second interface 608. The interconnected communication network 606 may be a distributed computer network, such

as the Internet; a wireless telephony network; a pager network; or a public switch telephone network (PSTN)

[0022] The redirection control message can be any application layer communications protocol including Remote Procedure Calls (RPC), InterProcess Communications (IPC) message, Simple Object Access Protocol (SOAP) message, email message, HyperText Transfer Protocol (HTTP) message, or file transfer protocol (FTP) message.

[0023] Referring to FIG. 7, another illustrative system for determining and communicating proximity information is shown. The system includes a cradle 704 housing a removable and mobile communication device 702. The cradle 704 is coupled to a personal computer 706. The computer 706 is connected to a network access point 708, such as a modem, broadband modem, router, or data network switch, which is coupled to the interconnected network 710. An example of the interconnected network is the Internet. The computer 706 includes a call redirection module 708 that may perform functions similar to those described with respect to the call control module 604 and may be used to communicate location data, proximity germinations, and other messaging associated with the proximity system.

[0024] Referring to FIG. 8, an illustrative mobile communication device is shown. The mobile device includes a housing 802 and an antenna 822. The mobile device also includes a processor 804 and a memory 806. The memory 806 includes various data such as global positioning system (GPS) location data 808, network location data 810, processing instructions 812, and data parameters 814. The mobile device also includes a user interface 816, such as a display screen and keypad, GPS receiver circuitry 818, and a network communication circuitry module 820. The network communication circuitry may include an interface for connection to a proximity sensor, such as an electrical connection for establishing electrical contact upon insertion of the mobile device into a cradle. A battery 824 within the mobile device may be charged by an attached cradle via the electrical connection. The mobile device may included other communication circuitry for detecting or communicating the presence of the mobile device within a coverage area of a proximity sensor.

[0025] The illustrated system and method of providing a Find-Me-Follow-Me Service using retrievable proximity location data has several benefits. An example of such benefit is reduced delays for callers attempting to reach a subscriber to the service. Incoming calls that reach the Find-Me-Follow-Me Service may be quickly routed to the most likely subscriber phone based on the subscriber's current proximity zone information. By using the subscriber proximity information, the Find-Me-Follow-Me Service may intelligently attempt to locate the subscriber of a particular subscriber address, rather than perform a random search of all devices where the subscriber may be reached. In addition, while the disclosed system utilized localized proximity sensors to determine subscriber proximity, wide-area proximity sensors such as GPS or emergency 911 wireless services capabilities may alternately be utilized. In addition, unlicensed radio spectrum may also be used for providing communication and proximity determination between a mobile device and a proximity determination module within a base station. For example, when the handset is within a radio range of the base station, the handset is identified as being within the proximity zone associated with that base station. In addition, the radio may be replaced by other communication methods such as infrared or ultrasound.

[0026] In one particular embodiment, the disclosure is directed to a method of processing a call. The method includes receiving location data, storing the location data in a data record, receiving a first call, playing an announcement, prompting for a caller's name, receiving the caller's name, and retrieving the data record. The location data is received via an interconnected network. The location data is derived from a proximity sensor that is configured to provide a proximity determination with respect to a mobile device of a subscriber and the proximity sensor. The first call is received at a primary destination address associated with the subscriber. The data record is retrieved to identify a selected address that identifies a communication device of the subscriber. The communication device is located within a proximity zone proximate to the proximity sensor.

[0027] In another embodiment, the disclosure is directed to a method to update a proximity zone state. The method includes receiving location data, detecting a change in subscriber location based on the location data, determining a change from a first

proximity zone state to a second proximity zone state based on the subscriber location, and updating a data record. The location data is received via an interconnected network and is derived from a proximity sensor. The proximity sensor is configured to provide a proximity determination with respect to a mobile device of a subscriber and the proximity sensor. The data record is updated utilizing the location data and is accessible to a call redirection control system. The data record includes a proximity zone field, the proximity zone field is changed from a first proximity zone state to a second proximity zone state.

[0028] In a further embodiment, the disclosure is directed to a system for manipulating call redirection. The system includes a proximity sensor, computational circuitry, and an interconnected network access point to a computer network. The proximity sensor is configured to determine whether a mobile device is proximate to the proximity sensor. The computational circuitry is coupled to the proximity sensor. The proximity sensor is configured to communicate data to the computation circuitry. The data is associated with a proximity determination with respect to the mobile device and the proximity sensor. The interconnected network access point is coupled to the computational circuitry to transmit a call redirection control message via the interconnected network access point in response to the proximity determination.

[0029] In one exemplary embodiment, the disclosure is directed to an apparatus for controlling data redirection. The apparatus includes a receiver configured to receive data signals associated with a mobile location indicator, computational logic configured to determine whether the mobile location indicator is proximate to the receiver based on the received data signals, and a network interface. The computational logic is configured to communicate a redirect message via the network interface in response to determining that the mobile location indicator is proximate to the receiver. The redirect message may initiate redirection of data initially to be sent to a first network address to be redirected to a second network address when the mobile location indicator is proximate to the receiver. The redirect message may cancel a previous redirection of data when the mobile location indicator is not proximate to the receiver. The mobile location indicator may be a wireless telephone and the data signals may be control signals transmitted on a control

channel to a remote wireless network. The network interface may be configured to communicate with a wireless network. The network interface may be configured to communicate with a wired network.

[0030] The above disclosed subject matter is to be considered illustrative, and not restrictive, and the appended claims are intended to cover all such modifications, enhancements, and other embodiments which fall within the true spirit and scope of the present invention. Thus, to the maximum extent allowed by law, the scope of the present invention is to be determined by the broadest permissible interpretation of the following claims and their equivalents, and shall not be restricted or limited by the foregoing detailed description.